

A nurses' guide to the critical reading of research

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ABSTRACT

Objective

A sound theoretical foundation to guide practice is enhanced by the ability of nurses to critique research. This article provides a structured route to questioning the methodology of nursing research.

Primary Argument

Nurses may find critiquing a research paper a particularly daunting experience when faced with their first paper. Knowing what questions the nurse should be asking is perhaps difficult to determine when there may be unfamiliar research terms to grasp. Nurses may benefit from a structured approach which helps them understand the sequence of the text and the subsequent value of a research paper.

Conclusion

A framework is provided within this article to assist in the analysis of a research paper in a systematic, logical order. The questions presented in the framework may lead the nurse to conclusions about the strengths and weaknesses of the research methods presented in a research article. The framework does not intend to separate quantitative or qualitative paradigms but to assist the nurse in making broad observations about the nature of the research.

INTRODUCTION

Nurses worldwide need to continually look for *“solutions, choices and outcomes for patients that represent the best available knowledge internationally”* (Hamer and Collinson 1999 p.4) to constantly improve and validate nursing care. The Nurses and Midwives Board New South Wales (NMB NSW) Strategic Plan 2004 to 2007 includes an objective to promote education and research related to contemporary practice and educational programs leading to registration, enrolment and authorisation (NMB NSW 2006 clause 2). The United Kingdom Nursing and Midwifery Council (UK NMC 2002 clause 6.5) require a registered nurse or midwife to maintain their professional knowledge and competence by delivering care based on current evidence, best practice and, where applicable and available, validated research. Such an objective can be achieved if nurses and midwives develop an understanding of the research process and demonstrate an ability to retrieve and critically assess research findings.

Critical awareness is crucial to being a registered nurse or midwife. Hamer and Collinson (1999) suggest nurses should be more questioning, try to see more than one side of an argument; try to be objective rather than subjective; weigh the evidence; make judgements based on reason, evidence or logic; look at the meaning behind the facts; identify issues arising from the facts; and recognise when further evidence is needed. *“A nurse is responsible to ensure that the standard of the nurse’s practice conforms with professional standards with the object of enhancing the safety of the individual, any significant other person and colleagues”* (ANMC 2007 clause 2). This is echoed by the United Kingdom Nursing and Midwifery Council in their Code of Conduct which states: *“You are personally accountable for your practice. This means you are answerable for your actions and omissions, regardless of advice or directions from another professional”* (UK NMC 2002 clause 1.3). The importance of understanding, critically analysing and applying research becomes vital when so much rests on professional ability and accountability.

Given the amount and complexity of available information and the limitations of a nurses’ time, there is the need to use a process which provides a concise way to analyse the results of research findings (Hamer and Collinson 1999).

Critiquing Research

The essence of the successful critiquing of a research paper lies in achieving a balanced appraisal. The reader needs to look for the merits and demerits of the methods used as well as the applicability to the health care setting. A balanced appraisal also requires a degree of logic and objectivity in identifying the systematic course of enquiry which underpins the research. The ultimate aim of any critique undertaken by nurses is to consider the applicability to practice.

Research Methodology

A research report should contain a carefully and concisely worded problem statement identifying key variables (Polit and Hungler 1997). Research is often categorised as qualitative or quantitative, the former concentrating on words expressed by people in order to determine the reality of practice, whereas the latter tends to emphasise the use of numbers. Quantitative approaches to data collection and analysis have been developed within a traditional ‘scientific’ ethos (Burns and Grove 2001) whereas qualitative research means any kind of research that produces findings not arrived at by means of statistical procedures or other methods of quantification (Strauss and Corbin 1990). A quantitative approach may be chosen because the researcher wishes to collect information in a numerical form as the results will be based on rigour, objectivity and control (Burns and Grove 2001; Polit and Hungler 1997) whereas qualitative research allows the researcher to study things in their natural surroundings and attempt to interpret, or make sense of, phenomena (Denzin and Lincoln 2000).

Mixed method research is a combination of quantitative and qualitative approaches. Complex concepts of interest in nursing may require both approaches to sufficiently study the phenomena. Examples of different data collection methods might include questionnaires, the use of physiological

instruments to measure patient responses, as well as observation techniques to provide a more rounded picture of the concept under study (Burns and Grove 2001). The combined approaches are known as triangulation (Burns and Grove 2001; Polit and Hungler 1997).

Research Critique Framework

Title

The title should not be long and complicated and should reflect as much as possible what the research is about (Parahoo and Reid 1988). The title does not validate or invalidate the research (Parahoo and Reid 1988).

Author

Ryan-Wenger (1992) notes the authors' brief biographies may be important sources of information about academic degrees, certification, position and place of employment, from which clinical and research expertise can sometimes be discerned. Occasionally the journal style means this information is not provided.

Date

Research papers can be significantly delayed before publication. It is important to determine whether the paper has been developed from a recent piece of work in order to assess its relevance to inform current practice (Polit and Hungler 1997).

Journal

The editorial panel may be of interest. Members of the editorial panel or board may represent a combination of academic research and practice and may have either national or international representation.

Abstract/Summary

An abstract or summary should clearly outline the problem, the hypothesis or research question/s, aims and objectives of the study (Polit and Hungler 1997). It should also cite the methods, which may include either a qualitative or quantitative approach, or a combination of both, to collect the data, the results, conclusions and recommendations for practice (Parahoo and Reid 1988). Abstract length is usually limited to between 100-200 words. Not all journals cite an abstract (Polit and Hungler 1997).

Identifying the problem

The problem which initiated the research should be clearly described early in the report (Ryan-Wenger 1992). In order to evaluate the value of the research it is important for the hypothesis, aims and objectives to be clearly and unambiguously stated as too many questions may indicate that too much is being attempted (Parahoo and Reid 1988).

Literature Search

The literature review is generally summarised in the introductory section or under a specific heading such as a review of the literature (Polit and Hungler 1997). Reference to original sources is important as information can be taken out of context and used inappropriately therefore an abundance of secondary sources should be viewed with caution as they may not provide sufficient detail or possibly distort some aspects of the original research (Polit and Hungler 1997; Burns and Grove 1993). The purpose of the literature review is to discuss what is known, identify gaps in knowledge, establish the significance of the study and situate the study within the current body of knowledge (Polit and Hungler 1997). This is supported by Burns and Grove (2001), who consider the primary purpose of reviewing the literature is to gain a broad background or understanding of the available information related to the problem.

The researcher should also critically appraise and use the literature to inform their thinking and methodology (Polit and Hungler 1997). Journals often place strict limits on word length and format of the literature review, so check that superficiality or an incomplete review is not the result of editorial demand (Cormack 1995).

The search should consider how the major variables were explored previously by critiquing the strengths and limitations of the methods used eg design, sample and instrument (Burns and Grove 2001). Previous methods should be appraised in order for the researcher to assess their suitability or modification for the current research (Ryan-Wenger 1992).

In a short article it is not reasonable to expect an exhaustive list of references however they should

be relevant and current (Polit and Hungler 1997). In some cases there may be very little literature available, in which case this should be stated.

METHODOLOGY

Designs

There are numerous research designs. More common examples include: experimental (the investigator controls the independent variable and randomly assigns subjects to different conditions); quasi-experimental (the investigator manipulates an independent variable but subjects cannot be randomised); or descriptive (the main objective is to accurately portray characteristics of persons, situations, or groups and the frequency with which certain phenomena occur) (Polit and Hungler 1997). The choice of design should allow the variable to be measured or manipulated in the study (Burns and Grove 1993). It is worth asking whether the means by which the data was collected was the most useful way to explore the subject.

Both Minichiello et al (2004) and Polit and Hungler (1997) state that before a study can progress, the researcher will usually clarify and define the variables under investigation and specify how the variable will be observed and measured in the actual research situation. This is known as an operational definition (Minichiello et al 2004; Polit and Hungler 1997).

Instrument

It is important for the researcher to justify the use of the selected instrument. The rationale may clearly state the advantages and disadvantages of using one tool rather than another and the literature search should also have commented on the use of particular instruments in previous studies (Polit and Hungler 1997). The reliability and validity needs to be considered. Reliability refers to the degree of consistency or accuracy with which an instrument measures the attribute it has been designed to measure (Polit and Hungler 1997). Data retrieved may look authoritative but it could be incomplete or inaccurate or may not be sufficiently reliable to be of value in generalising to the larger population. Concurrently, validity refers to the degree or extent

to which the instrument measures the phenomena in the first place or “*reflects the abstract construct being examined*” (Burns and Grove 1993 p.342). Reliability and validity of the instrument is usually determined in the pre-test phase of the research known as a pilot study (Polit and Hungler 1997).

Sample

It would be ideal to include every relevant subject in a study but this is usually impossible, for example because of the economics related to size, time and cost (Polit and Hungler 1997). The total membership of a defined set of subjects from which the study subjects are selected is termed the ‘target population’. From this group the final population entered in the study is determined (Polit and Hungler 1997). There are a range of methods available for determining that the sample studied accurately represents the population to which the researcher wishes to generalise. Since the cost of a study is partially dependent on the number of subjects sampled, it is important to determine the fewest number of subjects required to yield valid results.

The paper should reveal the mechanism for arriving at the given sample eg random, stratified random, cluster. From a sampling point of view, each individual in the population should have an equal opportunity to be selected for the sample. The method which achieves this is random sampling (Burns and Grove 1993). Stratified random sampling allows the random selection of subjects from two or more strata of the population independently (Polit and Hungler 1997; Burns and Grove 1993). Cluster sampling involves the selection of a large group or groups (eg a nursing school) with sub-sampling on a smaller scale (eg nursing students) (Polit and Hungler 1997).

Small samples of subjects are likely to appear in qualitative research where interview approaches, observational methods, or case studies aim to gain depth of enquiry from a smaller group of respondents.

The sample should possess characteristics compatible with that of the target population in order to be representative. Generalisations can be more

readily made when the results of the research can be applied to the larger group (Polit and Hungler 1997). In addition to providing information about how the sample was selected, the paper should provide comment on the generalisability of the sample to the target population.

Ethics

The researcher is obliged to consider the implications of the proposed research for the participating subjects, their families and society (Burns and Grove 2001). Most nursing research usually requires the permission of an appropriate ethics committee (Hamer and Collinson 1999). This may for example be attached to a health authority or to a university. The committee may include clinicians, researchers, educators and lay people who devote a great deal of time and effort to protecting the rights of subjects under scrutiny by overseeing research proposals.

Ethical guidelines outline a set of standards for conducting research. Within their practice nurses have a moral and legal obligation to protect the privacy of an individual (ANMC 2007) and this holds true within nursing research. Equally important is the premise to protect individuals from the risk of significant harm (ANMC 2002).

The National Health and Medical Research Council has issued a national statement, the *National Statement on Ethical Conduct in Research Involving Humans*, which is intended for use by any researcher conducting research with human participants, any member of an ethical review body reviewing that research, those involved in clinical governance and potential research participants (NHMRC 2007).

Pilot Study

A pilot study is a small-scale version or trial run of the research. The function of a pilot study is to obtain information for improving the project or assessing its feasibility. Costly mistakes can be avoided by a pilot study (Polit and Hungler 1997).

Main Study

Collecting the data normally proceeds according to a previously well organised plan. The collection of data, no matter what instruments are employed, is

typically the most-time consuming phase of the study but will vary from project to project. Interviews and transcription may take years.

The paper should explain why the researcher has chosen a particular method of data collection. Questionnaires tend to be less costly and require less time and energy to administer than interviews. They also offer the possibility of complete anonymity and avoid any interviewer bias. The strengths of interviews are that the response rate will probably be high with a face to face format, members of society who cannot complete questionnaires (eg people who are blind or elderly) can be included, the interviewer or respondent can clarify questions and additional information can be gathered through observation (Polit and Hungler 1997).

Nursing studies most frequently involve the use of interviews or questionnaires, socio-psychological scales, direct observation or a biophysical measure because these methods lend themselves to studying nursing phenomena (Polit and Hungler 1997).

Other methods of data collection may be used such as focus groups where the group discuss questions on a given topic (Polit and Hungler 1997). Using focus groups as a form of data collection has many advantages. Group interaction can clarify or quantify ideas or assist analysis on notions not previously considered (Minichiello et al 2004). They can also be used to triangulate data or explore issues raised earlier using other methods (Minichiello et al 2004). However like all other forms of data collection the group interaction of the focus group can be affected by the personal characteristics of the participants such as class, gender and race. The researcher can also have less control over the conduct of the interview which could affect the quality of the data collected (Minichiello et al 2004).

Results

Numerical data tends to be presented in two forms, firstly as raw figures and percentages within the text and secondly, more visually, as line graphs, tables or histograms (Burns and Grove 2001). Although quantitative analysis can only be carried out with

numbers, the numbers themselves have no intrinsic worth so they need to be given meaning by those who are using them (Parahoo 1997). Levels of measurement exist to sort the numbers. The nurse needs to ask how clearly the researcher has explained their findings.

Measures of central tendency, also known as the average identify how near the usual response a particular variable lies (Burns and Grove 2001). These averages are expressed as mean, median and mode. The mean is arrived at by summing all scores and dividing by the number of subjects. The median represents the exact middle score or value in a distribution of scores. The mode is the value that occurs most frequently in a distribution of scores (Burns and Grove 2001; Polit and Hungler 1997).

Figures may be observed expressed as $p > 0.05$ or $p < 0.05$ which gives a level of significance known as probability. This means that techniques were used to ensure that each subject in the population had an equal chance of being selected (Minichiello et al 2004). If a probability result is statistically significant ($p = < 0.05$) the result had a less than 5% possibility of being caused by chance and therefore becomes significant and important (Polit and Hungler 1997).

Qualitative data may be reported in a more discursive way and may include such features as actual quotes from interviews and discussions with focus groups (Burns and Grove 2001). The inclusion of quotes will be limited by the word count allowed by the particular journal publishing the research.

DISCUSSION/RECOMMENDATIONS

This section centres on the judgement of the reader in evaluating the worth of the article. It may be that some or all of the recommendations could be implemented in practice readily or may be cautiously taken up and piloted over a period of time. Alternatively the results may not be considered unless modifications are made due to the unique features of a particular clinical setting or other serious limitations of the study. An important point to remember is that the research does

not necessarily prove a point and may only suggest a relationship or highlight an issue needing further investigation (Parahoo and Reid, 1988).

CONCLUSIONS

All major findings related to the original aims of the study are discussed in relation to whether the data supports or negates the hypothesis or research question/s (Parahoo and Reid 1988). In the discussion the reader should be able to evaluate the research design and the overall merit of the study, its strengths and weaknesses. Any significant weakness in either method or findings will seriously devalue the research itself. Competent researchers will highlight these concerns themselves, perhaps under a section titled limitations of the study.

REFERENCE LIST

Research papers conclude with a list including books, reports, other journal articles which have been used to support the concepts outlined. For those interested in pursuing additional reading on the topic, the reference list of a current study provides an excellent starting place (Polit and Hungler 1997).

The Framework

The framework is a visual tool to stimulate questions to assist in the assessment of the value of a research paper. The framework is intended to allow the reader to question each section of any paper, allowing better interpretation of the contents.

The framework provides trigger questions; the reader should explore them within the paper and provide a rationale for the researcher's inclusion or omission.

CONCLUSION

The methodological approach used in this paper provides a framework to analyse research papers logically and systematically. Nurses need to use sound theoretical foundations to guide practice. While this paper is deliberately simplified it still allows for the major components of the research process to be identified and considered.

Process	Considerations when critiquing a research article
1. Title	Is the title clear and accurate ie does it describe the research?
2. Author	What are the author's qualifications and current position?
3. Date	When was the research undertaken? When was it published? Is it a recent piece of work? Is it relevant to present practice? NB. This is not always easy to establish with online articles.
4. Journal	Does the journal deal in nursing research? Are the members of the editorial board from a wide range of academia and practice? Who is the target audience? Broad or specific?
5. Abstract/Summary	Does the abstract clearly outline the problem, the hypothesis/research question, aims and objectives, methodology, results, conclusions and recommendations? Are you clear about what is being investigated?
6. Identifying the problem	Is the problem and/or purpose of the study clearly identified? Is there a rationale for the study?
7. Formulation of research questions (qualitative design) or hypotheses (experimental design)	Are the aims and objectives clearly stated? How many research questions/hypotheses? Is too much being attempted? Does the hypothesis follow logically from the original problem? Do the aims and/or question/s follow logically from the original problem?
8. Literature search	Is there an unbiased discussion of related research? Does the researcher demonstrate insight into the subject under study? Is there an appropriate timescale for the literature cited? Does the search identify whether a theoretical framework has been used? Is the search a collection of quotes or does it critically appraise previous studies?
9. Methodology	
Design	Is the study described adequately? Can you identify what type of study is used, eg descriptive, experimental, quasi-experimental?
Tools	Are the reasons for the choice of instrument given eg questionnaire, observation, interview, patient records, diaries? Is the advantage/limitation of the tool used discussed?
Sample	Is the sample representative of the population under study? Have the characteristics of the sample been considered eg size, culture, gender? How appropriate is the method of sample selection?
Ethics	Has informed consent been given? Is confidentiality and anonymity assured? Was the right not to participate explained? Was dignity upheld? Were the subjects free from harm? Was ethics committee approval sought?
Reliability and validity	Has the study considered the issue of reliability and validity? Is the research methodology biased?
10. Pilot study	Has a pilot study been completed? What modifications were made and why?
11. Main study	
Results	Are the raw figures and percentages or dialogue provided in the text? Are they visually presented eg graphs, bar charts, scatter-grams, extracts of dialogue? Is the rationale provided for the inclusion or omission of statistical testing? Is the probability of the result by chance included?
Discussion/ Recommendations	Is the discussion of the results understandable? Are the recommendations self-evident after reading the rest of the paper? Are the recommendations able to be implemented? Has the researcher acknowledged their limitations? Are their suggestions for further research?
Conclusions	Do the conclusions relate logically to the results? Are there any distortions attempted to 'fit' preconceived ideas? Are the aims, questions or hypothesis posed earlier addressed? What omissions have been made and has the researcher referred to these?

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